

Critical Care Nephrology: A Multidisciplinary Approach

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Key Words

Critical care nephrology · Acute kidney injury · Acute kidney disease · Precision medicine

Abstract

Acute kidney injury (AKI) is a serious medical condition affecting millions of people. Patients in intensive care unit (ICU) who develop AKI have increased morbidity and mortality, prolonged length of stay in ICU and hospital and increased costs, especially when they require renal replacement therapy. In the latter case, morbidity and mortality increase further. In order to meet the needs of the critically ill patients, a multidisciplinary care team is required, combining the efforts of physicians and nurses from different disciplines as well as nephrologists and intensivists. A personalized patient management is strongly recommended as proposed by the recent criteria of precision medicine. Early identification of patients at risk and timely intervention in case of AKI diagnosis can be obtained by integrating the role of nephrologist in the ICU practice. An innovative model of organization by introducing the nephrology rapid response team is advocated to manage critically ill patients with kidney problems in order to make early diagnosis and interventions, to reduce progression toward CKD and improve renal recovery. The routine adoption of AKI biomarkers together with such a collegial teamwork may represent the pathway toward success.

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Introduction

Acute kidney injury (AKI) is a serious medical condition affecting more than 10 million people around the world [1]. The incidence in the intensive care unit (ICU) population is between 20 and 30% depending on the used definition, and more than 10% of all patients admitted to the ICU require renal replacement therapy (RRT) for AKI [2]. The spectrum of AKI has recently expanded to the phase of recovery that may require a follow up for a period as long as 3 months. In this time window, the syndrome is called acute kidney disease (AKD) [3, 4].

The Rise of Critical Care Nephrology

The diagnosis and management of AKD is complex and requires a multidisciplinary effort, which is the basis for the new specialty called critical care nephrology (CCN). Not only nephrologists but also critical care physicians, cardiologists and cardiac surgeons should be involved collegially in this endeavor [5].

In fact, a multidisciplinary care team can address the multiple needs of a critically ill patients based on the pathophysiological foundations of the syndrome. In this setting, it is essential to identify the population and the single individual at risk of developing AKI [6, 7]. As for mechanical ventilation, the teamwork in CCN could rep-

resent a lifesaving approach putting together all the specific knowledge to improve patient outcome.

It has been pointed out in multiple occasions that all ICU patients should be managed together by specialists in a large multidisciplinary department of critical care medicine, with adequate numbers of specially trained intensivists, nurses and other healthcare staff available to deal with all acute problems [8].

How many specialists are needed to effectively treat a critical ill patient? May be it is easier to think about a team with interacting colleagues that can share decisions, accept others points of view and have a well-structured work plan for a complex medical problem. It is almost impossible for a single individual to possess all the knowledge and information necessary to provide optimal therapy [9]. A symphony cannot be played by one individual. It takes an orchestra to play it. We can play different instruments but we need to be on the same key. The fine tuning of this team can be done by the case manager who will be identified among the different physicians of the CCN group.

It should be easy and logical for all members of the team (healthcare personnel) to accept help and advice from others. Joining the different points of view and the various elements of knowledge will help to multiply the understanding of the complex syndrome and will allow to minimize possibility of errors or oversights.

The expertise of the team in different areas of medicine can provide a good balance between effectiveness/experience and the basic principles of medicine, such as quality of care and patient safety, for a final result of good clinical practice and patients' improvement (fig. 1).

In light of the recent recommendation of precision medicine [10–12], a team may better allow targeting treatments specifically chosen for an individual to find the best fit for this specific patient. This will also provide a global vision of the patient rather than an organ-specific interpretation of a syndrome. Physicians should combine knowledge and expertise, be modest and collegial, be constructive and interdisciplinary in their approach to patient care [9].

AKI management is a continuum from detection to treatment, starts with an increase of susceptibility and might end with a complete failure of the organ because the approach of AKI does not often include continuous re-evaluation of treatment and need of RRT [6, 13].

Once in ICU, a patient may develop a wide spectrum of AKI conditions: from kidney attack, subclinical AKI and complete AKI from non-severe (no need for RRT, KDIGO stages 1–2) to severe AKI (needs of RRT) [14].

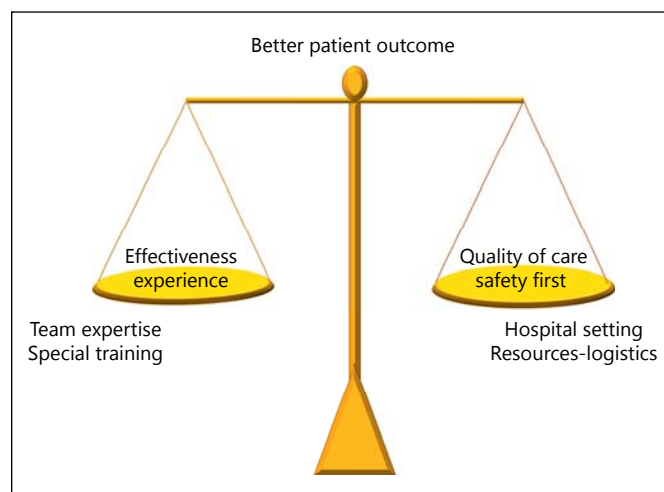


Fig. 1. It shows the ideal balance of an expert team with special training.

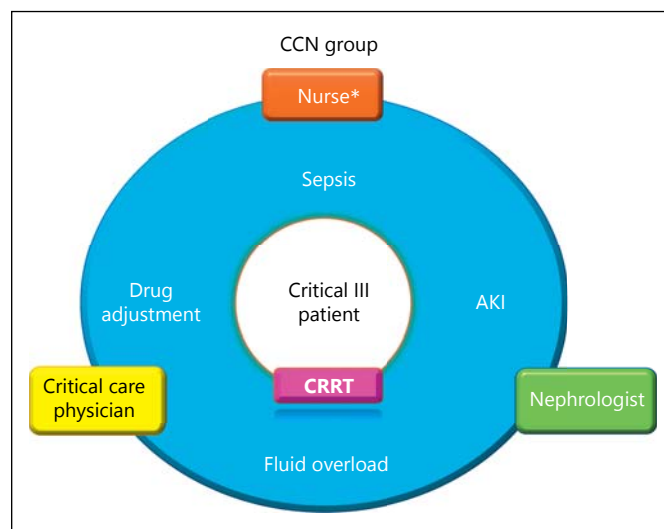


Fig. 2. The integration of the CCNT. * Nurses from nephrologist department and ICU should also work together as a team.

The CCN Team

For all these reasons, we strongly recommend the creation of a CCN team (CCNT) in order to approach common problems in ICU patients such as fluid overload, cardiorenal syndromes and AKI [15] (fig. 2). In this endeavor, the implementation of AKI biomarkers in routine clinical practice may induce ICU physicians to involve nephrologists earlier in these clinical scenarios, not only to help resolving the already established problem, but also to contribute toward implementing preventive and pro-

tective measures in order to avoid the onset and progression of organ damage/dysfunction and further complications that may affect patient's quality of life during hospital stay and after discharge.

Early nephrology consultation for hospital-acquired AKI has been associated with reduced need for RRT, reduced mortality and reduced length of hospital stay [16]. Early identification of AKI may allow the application of protective measures and suitable management, geared to reduce progression and improve renal recovery [6, 17]. AKI is a short-term event that can, however, have a sequel up to 3 months or even later (late recovery) [18].

In this view, we strongly advocate the inclusion of nephrology divisions into the critical care and emergency departments rather than in the department of medicine. The need for a nephrologist in the ICU as a permanent staff member could be justified because of the high incidence of AKI. AKI is the most common organ dysfunction in ARDS patients, which increase mortality by 40% [15]. Nephrologists should make rounds in the ICU together with ICU physicians to avoid the development of emergency conditions that require urgent extracorporeal therapies [19, 20]. The time of initiation of RRT can therefore be defined by every single patient need (as suggested by precision medicine) rather than being justified by conflicting randomized controlled trials [21, 22].

Recently the ADQI consensus group proposed to unify and harmonize the scientific language concerning RRTs in critically ill patients [23–25]. Standardization of terminology is also quintessential for the optimal utilization of big data files and electronic medical records in

future pragmatic trials [10]. Clinicians must therefore take advantage of new technology to improve clinical care and patient outcome [6, 26].

Conclusion

Previous efforts have been taken to make a consensus about the importance of working together as a team in the area of CCN. Ideally, this approach should provide significant benefits to the critically ill patients.

However, there is still a lot of room for further improvement in many clinical settings to achieve a real implementation of a multidisciplinary approach to AKI, preventive strategies, management options and all actions tailored to specific patient's need or specific disease condition [10].

Standard criteria and decision making algorithms necessary to encompass the variety of factors that can influence clinical outcomes can only be developed in a collegial environment. From our experience in Vicenza, the implementation of the nephrology rapid response team [27] is one of the most advanced applications of the concept of CCN philosophy. We hope that many other centers will implement the same project and will verify the utility of this multidisciplinary approach based on precision medicine.

Disclosure Statement

None of the authors have anything to disclose.

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